WHAT IS CLAIMED IS:

1. An electrochemical cell for generating electrical energy from oxidation-reduction electron transfer, said electrochemical cell for use with active implantable medical devices, and said electrochemical cell comprising:

an anode having a first immobilized enzyme deposited on a first surface of said anode, said first immobile enzyme for catalyzing an electrooxidation of a reducing agent;

a cathode having a second immobilized enzyme deposited on a second surface of said cathode, said second enzyme for catalyzing an electroreduction of an oxidizing agent;

an aqueous solution containing said reducing agent and said oxidizing agent, said solution in contact with said first immobilized enzyme and said second immobilized enzyme; and

a housing for providing mechanical support and electrical separation of said anode and said cathode.

2. The electrochemical cell of claim 1 wherein said first immobilized enzyme comprises glucose oxidase.

3. The electrochemical cell of claim 2 wherein said glucose oxidase further comprises a plurality of biocolloidal substrates for increasing reactive surface area of said electrooxidation of said reducing agent.

4. The electrochemical cell of claim 1 wherein said second immobilized enzyme comprises laccase.

5. The electrochemical cell of claim 4 wherein said laccase further comprises a plurality of biocolloidal substrates for increasing reactive surface area of said electroreduction of said oxidizing agent.

6. The electrochemical cell of claim 2 wherein said reducing agent comprises glucose.

7. The electrochemical cell of claim 6 wherein said glucose oxidase further comprises a plurality of biocolloidal substrates for increasing reactive surface area of said electrooxidation of said glucose.

8. The electrochemical cell of claim 4 wherein said oxidizing agent comprises oxygen.

9. The electrochemical cell of claim 8 wherein said laccase further comprises a plurality of biocolloidal substrates for increasing reactive surface area of said electroreduction of said oxygen.

10. The electrochemical cell of claim 1 wherein said anode further comprises a plurality of nanostructured rods, said nanostructured rods attached vertically to said first surface of said anode.

11. The electrochemical cell of claim 10 wherein each of said plurality of nanostructured rods is comprised of gold.

12. The electrochemical cell of claim 10 wherein each of said plurality of nanostructured rods comprises titanium.

13. The electrochemical cell of claim 10 wherein each of said plurality of nanostructured rods comprises a carbon nanotube.

14. The electrochemical cell of claim 1 wherein said cathode further comprises a plurality of nanostructured rods, said nanostructured rods attached vertically to said second surface of said cathode.

15. The electrochemical cell of claim 14 wherein each of said plurality of nanostructured rods is comprised of gold.

16. The electrochemical cell of claim 14 wherein each of said plurality of nanostructured rods comprises titanium.

17. The electrochemical cell of claim 14 wherein each of said plurality of nanostructured rods comprises a carbon nanotube.

18. The electrochemical cell of claim 1 wherein said housing further comprises a biologically compatible material.

19. The electrochemical cell of claim 18 wherein said housing further comprises at least one permeable membrane for excluding macromolecules from said anode and said cathode of said electrochemical cell.

20. An electrochemical cell for generating electrical energy from oxidation-reduction electron transfer, said electrochemical cell for use with active implantable medical devices, and said electrochemical cell comprising:

an anode having an immobilized layer of glucose oxidase deposited on a first surface of said anode, said immobilized layer of glucose oxidase for catalyzing an electrooxidation of glucose;

a cathode having an immobilized layer of laccase deposited on a second surface of said cathode, said immobilized layer of laccase for catalyzing an electroreduction of oxygen;

an aqueous solution containing said glucose and said oxygen, said aqueous solution in contact with said glucose oxidase and said laccase; and

a housing for providing mechanical support and electrical separation of said anode and said cathode.

21. The electrochemical cell of claim 20 wherein said glucose oxidase further comprises a plurality of biocolloidal substrates for increasing reactive surface area of said electrooxidation of said glucose.

22. The electrochemical cell of claim 20 wherein said glucose oxidase further comprises a plurality of biocolloidal substrates for increasing reactive surface area of said electroreduction of said oxygen.

23. The electrochemical cell of claim 20 wherein said anode further comprises a plurality of nanostructured rods, said nanostructured rods attached vertically to said first surface of said anode.

24. The electrochemical cell of claim 23 wherein each of said plurality of nanostructured rods is comprised of gold.

25. The electrochemical cell of claim 23 wherein each of said plurality of nanostructured rods comprises titanium.

26. The electrochemical cell of claim 23 wherein each of said plurality of nanostructured rods comprises a carbon nanotube.

27. The electrochemical cell of claim 20 wherein said cathode further comprises a plurality of nanostructured rods, said nanostructured rods attached vertically to said second surface of said cathode.

28. The electrochemical cell of claim 27 wherein each of said plurality of nanostructured rods is comprised of gold.

29. The electrochemical cell of claim 27 wherein each of said plurality of nanostructured rods comprises titanium.

30. The electrochemical cell of claim 27 wherein each of said plurality of nanostructured rods comprises a carbon nanotube.

31. The electrochemical cell of claim 20 wherein said housing further comprises a biologically compatible material.

32. The electrochemical cell of claim 23 wherein said housing further comprises at least one permeable membrane for excluding macromolecules from said anode and said cathode of said electrochemical cell.

33. An electrochemical cell for generating electrical energy from oxidation-reduction electron transfer, said electrochemical cell for use with active implantable medical devices, and said electrochemical cell comprising:

an anode having an immobilized layer of glucose oxidase deposited on a first surface of said anode, said anode further comprising a plurality of nanostructured rods, said nanostructured rods attached vertically to said first surface of said anode, said immobilized layer of glucose oxidase for catalyzing an electrooxidation of glucose, and said immobile layer of glucose oxidase further comprising a plurality of biocolloidal substrates for increasing a reactive surface area of said electrooxidation of said glucose;

a cathode having an immobilized layer of laccase deposited on a second surface of said cathode, said cathode further comprising a plurality of nanostructured rods, said nanostructured rods attached vertically to said second surface of said cathode, said immobilized layer of laccase for catalyzing an electroreduction of oxygen, and said immobile layer of laccase further comprising a plurality of biocolloidal substrates for increasing reactive surface area of said electroreduction of said oxygen;

an aqueous solution containing said glucose and said oxygen, said aqueous solution in contact with said glucose oxidase and said laccase; and

a housing for providing mechanical support and electrical separation of said anode and said cathode, said housing having at least one permeable membrane for excluding macromolecules from said anode and said cathode of said electrochemical cell.

34. The electrochemical cell of claim 33 wherein each of said plurality of nanostructured rods is comprised of gold.

35. The electrochemical cell of claim 33 wherein each of said plurality of nanostructured rods comprises titanium.

36. The electrochemical cell of claim 33 wherein each of said plurality of nanostructured rods comprises a carbon nanotube.

37. The electrochemical cell of claim 33 wherein said housing further comprises a biologically compatible material.

38. In an electrochemical cell for generating electrical energy from electron transfer in an oxidation-reduction process, said electrochemical cell for use with active implantable medical devices, an electrode comprising:

a substrate having a top surface and a bottom surface;

a plurality of nanostructured rods, said plurality of nanostructured rods attached vertically to said top surface of said substrate; and

an immobilized enzyme layer deposited on said top surface of said substrate and on said plurality of nanostructured rods, said immobilized enzyme layer for catalyzing said oxidation-reduction process.

39. The electrode of claim 38 wherein each of said plurality of nanostructured rods is comprised of gold.

40. The electrode of claim 38 wherein each of said plurality of nanostructured rods comprises titanium.

41. The electrode of claim 38 wherein each of said plurality of nanostructured rods comprises a carbon nanotube.

42. The electrode of claim 38 wherein said immobilized enzyme layer further comprises a plurality of biocolloidal substrates for increasing a reactive surface area of said oxidation-reduction process.

43. In an electrochemical cell for generating electrical energy from electron transfer in an oxidation-reduction process, said electrochemical cell for use with active implantable medical devices, a method for fabricating an electrode comprising the steps of:

forming a substrate having a top surface and a bottom surface;

growing a plurality of nanostructured rods on said top surface of said substrate, said plurality of nanostructured rods oriented vertical to said top surface of said substrate; and

depositing an immobilized enzyme layer on said top surface of said substrate and on said plurality of nanostructured rods, said immobilized enzyme layer for catalyzing said oxidation-reduction process.

44. The method of claim 43 wherein said step of forming said substrate further comprises a step of depositing a seed layer of gold on said top surface of said substrate.

45. The method of claim 44 wherein said step of growing said plurality of nanostructured rods comprises a step of electrodeposition.

46. The method of claim 44 wherein said step of growing said plurality of nanostructured rods comprises a step of chemical vapor deposition.

47. The method of claim 43 wherein said step of depositing said immobilized enzyme layer further comprises the steps of:

forming a plurality of biocolloidal substrates for increasing a reactive surface area of said electrode; and

depositing said plurality of biocolloidal substrates on said top surface of said substrate and on said plurality of nanostructured rods.

48. An electrochemical cell comprising:

an anode;

a first immobilized enzyme deposited on said anode, said first immobile enzyme for catalyzing an electrooxidation of a reducing agent;

a cathode;

a second immobilized enzyme deposited on said cathode, said second enzyme for catalyzing an electroreduction of an oxidizing agent; and

an aqueous solution containing said reducing agent and said oxidizing agent, said solution in contact with said first immobilized enzyme and said second immobilized enzyme.

49. A fuel cell comprising:

nanostructured metal nanowires or carbon nanotube electrodes; and

immobilized anode and cathode enzymes deposited on the nanowires or the electrodes.